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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/938,644	08/27/2001	Neal Rueger	M4065.0466/P466	1172
24998	7590	04/15/2004	EXAMINER	
DICKSTEIN SHAPIRO MORIN & OSHINSKY LLP			ALANKO, ANITA KAREN	
2101 L STREET NW			ART UNIT	
WASHINGTON, DC 20037-1526			PAPER NUMBER	

1765

DATE MAILED: 04/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 09/938,644	Applicant(s) RUEGER, NEAL	
	Examiner Anita K Alanko	Art Unit 1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on RCE & IDS 3/2/04.
- 2a) ☐ This action is FINAL.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-66 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 28-52 is/are allowed.
- 6) ☒ Claim(s) 1, 12-27, 53 and 55-66 is/are rejected.
- 7) ☒ Claim(s) 2-11 and 54 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>3/2/04</u> . | 6) <input type="checkbox"/> Other: _____  |

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***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after allowance or after an Office action under *Ex Parte Quayle*, 25 USPQ 74, 453 O.G. 213 (Comm'r Pat. 1935). Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's IDS filed on 3/2/04 has been considered.

The allowability of claims 1, 12-27, 53, 55-66 is withdrawn in view of newly cited Yamagata.

***Claim Objections***

Claims 63 and 64 are objected to because of the following informalities: they depend on each other and are therefore confusing. Appropriate correction is required.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 14-20, 23, 25, 53, 57-63, 65 and 66 are rejected under 35 U.S.C. 102(b) as being anticipated by Yamagata et al (US 5,441,595).

Yamagata discloses a method (Fig.10A-10D) comprising:

providing a substrate 38, 100 in a processing chamber (Fig.8), said substrate comprising an etchable material 106 and having at least one contoured feature H1, H2 or H3 (Fig.10A, 10B or 10C; col.6, lines 56-59),

generating a stable ion-containing etching plasma in said processing chamber, said plasma etching the contoured feature of said substrate;

generating a magnetic field, said magnetic field being adjustable in intensity and direction;

applying an RF bias power to said substrate, said RF bias power being adjustable in intensity; and

controlling said etching of the contoured feature by creating an electron differential at said contoured feature by adjusting the RF bias power intensity during said etching (col.4, lines 40-43; col.6, line 62-col.7, line 5), thereby forming a second contoured feature at said contoured feature H2, H3 or VH4 (Fig.10A-10C).

As to claims 14-18, 57-61, Yamagata discloses that the coutoured feature comprises a trench or hole (H1-H3, VH4), which encompasses a protrusion as there are several trenches across the surface which form hills and valleys, or trenches and protrusions (such as a pillar).

As to claims 19-20 and 62, Yamagata discloses to etch with CF<sub>4</sub> and argon, a fluorocarbon and noble gas (col.6, line 45).

As to claims 23 and 63, Yamagata does not disclose the strength of the magnetic field, however it is expected to be as cited since the same method steps are being conducted with the same results of forming a second contour, as in the present invention.

As to claims 24 and 65, Yamagata discloses to use electric coils 46 (Fig.8).

As to claims 53 and 66, see the discussion above. Yamagata discloses to vary the location of said etching during said etching by varying the location of impingement of the free electrons on said material layer by changing the RF bias.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 12-27, 53, 55-66 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamagata et al (US 5,441,595).

The discussion of Yamagata from above is repeated here.

As to claims 12-13 and 55-56, Yamagata does not disclose the composition of the insulating layer 106. It would have been obvious to one with ordinary skill in the art to use silicon oxide or silicon nitride as the etchable material in the method of Yamagata because they are conventional insulating materials.

As to claims 21-22, Yamagata does not disclose to use an etchant comprising oxygen or carbon chloride. It would have been obvious to one with ordinary skill in the art to use oxygen or carbon chloride as the etchant in the method of Yamagata because they are conventional etchants.

As to claims 24 and 64, Yamagata discloses to use an electric coil, not a permanent magnet. Apparatus limitations, unless they affect the process in a manipulative sense, may have

little weight in process claims. *In re Tarczy-Hornoch* 158 USPQ 141, 150 (CCPA 1968); *In re Edwards* 128 USPQ 387 (CCPA 1961); *Stalego v. Heymes* 120 USPQ 473, 478 (CCPA 1959); *Ex parte Hart* 117 USPQ 193 (PO BdPatApp 1957); *In re Freeman* 44 USPQ 116 (CCPA 1940); *In re Sweeney* 72 USPQ 501 (CCPA 1947). It would have been obvious to one with ordinary skill in the art to use a permanent magnet to generate the magnetic field because it is functionally equivalent to using an electric coil or because it is a conventional to use permanent magnets to generate a magnetic field.

As to claims 26-27, Yamagata does not disclose the value of the bias power. It would have been obvious to one with ordinary skill in the art to use a bias power within the cited range because the bias power appears to reflect a result-effective variable which can be optimized. See MPEP 2144.05 IIB. It would have been still further obvious to use an inductive power within the range cited because it is functionally equivalent to an RF bias power or because it is a conventional method to bias the substrate during etching, and the bias power appears to reflect a result-effective variable which can be optimized.

#### ***Allowable Subject Matter***

Claims 2-11 and 54 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 28-52 are allowed.

The following is an examiner's statement of reasons for allowance: the prior art does not teach or suggest a method of forming a microstructure by micromachining, comprising

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providing a substrate in a processing chamber, said substrate comprising an etchable material and having at least one contoured feature,

generating a stable ion-containing etching plasma in said processing chamber, said plasma etching the contoured feature of said substrate;

generating a magnetic field, said magnetic field being adjustable in intensity and direction;

applying an RF bias power to said substrate, said RF bias power being adjustable in intensity; and

controlling said etching of the contoured feature by creating an electron differential at said contoured feature by adjusting at least one of said magnetic field intensity or magnetic field direction during said etching, thereby forming a second contoured feature at said contoured feature, as in the context of claim 2.

The closest prior art in the newly filed IDS, Schaepkens et al, discloses etching to form contours by changing the magnetic field (Fig. 1a and 1b depict the absence of a magnetic field and the presence of a weak magnetic field). However, these are separate experiments, and is not equivalent and does not suggest to form a second contour at said first contour (as shown, for example in Figures 9-12A) by adjusting the magnetic field intensity or direction during said etching, as in the context of claim 2. Yamagata discloses to vary the RF bias power, but does not suggest to vary the magnetic field intensity or direction during said etching to form a second contour at the first contour, as in the context of claim 2.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue

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fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### *Conclusion*

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Leung and JP 01-270229 A are cited to show varying process parameters to form second contours at a first contour.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anita K Alanko whose telephone number is 571-272-1458. The examiner can normally be reached on Mon, Tues & Fri: 8:30 am-5 pm; Wed&Thurs: 10 am-2 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

*Anita K. Alanko*

Anita K Alanko  
Primary Examiner  
Art Unit 1765